National Institute of Environmental Health Sciences

The Indian Ocean Dipole and malaria risk in the highlands of western Kenya

Author(s): Hashizume M, Terao T, Minakawa N
Year: 2009
Journal: Proceedings of The National Academy of Sciences of The United States of America. 106 (6): 1857-1862

Abstract:

Epidemics of malaria in the East African highlands in the last 2 decades have often been associated with climate variability, particularly the El Nino-Southern Oscillation (ENSO). However, there are other factors associated with malaria risk and there is increased interest in the influences of the Indian Ocean Dipole (IOD), a climate mode of coupled ocean-atmosphere variability, on East African rainfall. This study explores the relationship between IOD and the number of malaria patients in 7 hospitals from 2 districts in the western Kenyan highlands, controlling for the effects of ENSO. We examined temporal patterns (1982-2001) in the number of malaria cases in relation to the dipole mode index (DMI), defined as the difference in sea surface temperature anomaly between the western (10 degrees S-10 degrees N, 50 degrees-70 degrees E) and eastern (10 degrees S-0 degrees, 90 degrees-110 degrees E) tropical Indian Ocean. We used Poisson regression models, adjusted for ENSO index Nino 3 region (NINO3), seasonal and interannual variations. The number of malaria patients per month increased by 3.4%-17.9% for each 0.1 increase above a DMI threshold (3-4 months lag). Malaria cases increased by 1.4%-10.7% per month, for each 10 mm increase in monthly rainfall (2-3 months lag). In 6 of 7 places, there was no evidence of an association between NINO3 and the number of malaria cases after adjusting for the effect of DMI. This study suggests that the number of malaria cases in the western Kenyan highlands increases with high DMI in the months preceding hospital visits.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2644128

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

El Nino Southern Oscillation, Meteorological Factors, Precipitation, Temperature, Other Exposure

Temperature: Fluctuations

Other Exposure: Indian Ocean Dipole

Geographic Feature:

resource focuses on specific type of geography

Other Geographical Feature

Other Geographical Feature : highlands

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Country

Other African Country: Kenya

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Malaria

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content